



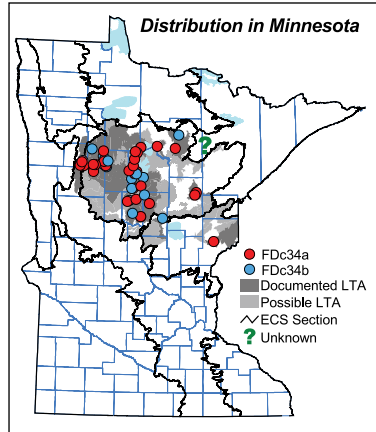
Central Dry-Mesic Pine-Hardwood Forest

Dry-mesic pine, hardwood, or pine-hardwood forests on hummocky glacial moraines, often adjacent to outwash plains. Crown fires and mild surface fires were common historically.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 59 plots (relevés).

- **Ground layer** is patchy to continuous (25–100% cover) with abundant large-leaved aster (*Aster macrophyllus*). Other common species include Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), bracken (*Pteridium aquilinum*), and early meadow-rue (*Thalictrum dioicum*).
- **Shrub layer** is interrupted to continuous (50–100% cover) with abundant beaked hazelnut (*Corylus cornuta*) and occasional red maple saplings, bush honeysuckle (*Diervilla lonicera*), chokecherry (*Prunus virginiana*), and juneberries (*Amelanchier* spp.).
- **Subcanopy** is patchy (25–50% cover), with red maple sometimes abundant.
- **Canopy** is interrupted to continuous (50–100% cover) and variable in composition but most commonly dominated by red pine or white pine, or a mixture of the two, with smaller amounts of paper birch, quaking aspen, red maple, jack pine, northern red oak, and bur oak. Less commonly, the canopy is dominated by a combination of northern red oak, quaking aspen, paper birch, bur oak, red maple, big-toothed aspen, and basswood. In mixed pine-hardwood forests, pines often form a taller supercanopy over a shorter canopy of hardwoods.



Landscape Setting & Soils

- **Stagnation moraines and sand-capped till plains**—Common. Present mainly on hummocky or rolling terrain adjacent to fire-prone outwash plains. Parent material is a discontinuous cap of partially sorted sand and gravel over a base of denser till and is often complexly stratified. The underlying clayey till is normally more than 60in (150cm) below the soil surface but can be at or near the surface on hilltops. This parent material initially was calcareous, but free carbonates are usually leached to depths greater than 30in (75cm). Water retention in these soils is related to stratification in the sand or gravel cap and depth to the underlying clayey till. Where the cap is thick or poorly stratified, soils are somewhat excessively drained, and the soil-moisture regime is moderately dry. Where the cap is thinner or well stratified, soils are well drained, and the soil-moisture regime is moderately fresh or fresh. (Chippewa Plains, Pine Moraines & Outwash Plains, and St. Louis Moraines in MDL; northern part of Hardwood Hills in MIM; and WSU)

Natural History

In the past, fires were very common throughout the range of FDC34. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was about 110 years, and the rotation of mild surface fires about 30 years. The rotation of all fires combined is estimated to be 23 years. Windthrow was not common, with an estimated rotation exceeding 1,000 years. Based on the historic composition and age structure of these forests, FDC34 had three growth stages separated by two periods of transition.

- **0–55 years**—Young forests recovering from fire, with mixed canopies of quaking or big-toothed aspen and red pine. Jack pine, white pine, and northern red oak are present as minor components.
- **55–95 years**—A transition period marked by a decline in aspen and a sharp increase in red pine. Northern red oak also declines significantly, while white pine increases.



- **95–135 years**—Mature forests dominated by red pine. Cohorts of young red pine, white pine, and some jack pine become established in the understory following surface fires; where surface fires have been very mild or absent, white pine tends to be more common in the understory than red pine or jack pine.
- **135–175 years**—A transition period marked by the elimination of jack pine and a substantial decline in red pine, mirrored by an increase in white pine.
- **> 175 years**—Very old forests strongly dominated by white pine, mixed with some old red pine and a minor component of miscellaneous deciduous trees.

Similar Native Plant Community Classes

• FDN33 Northern Dry-Mesic Mixed Woodland

FDN33, like FDC34, has variable canopy composition and can be dominated by red pine, white pine, quaking aspen, or paper birch, with red maple common in the subcanopy. FDN33 occurs mainly to the northeast of FDC34, but the ranges of the two classes overlap widely in the MDL.

FDC34 Indicator Species	(freq%)		FDN33 Indicator Species	(freq%)	
	FDC34	FDN33		FDC34	FDN33
Black cherry (U)	27	3	Groundpine**	3	24
Poison ivy (<i>Toxicodendron rydbergii</i>)	68	10	Balsam fir (C, U)	10	65
Hog peanut (<i>Amphicarpaea bracteata</i>)	36	6	Green alder (<i>Alnus viridis</i>)	3	18
American hazelnut (<i>Corylus americana</i>)	29	7	Cow wheat (<i>Melampyrum lineare</i>)	5	21
Northern red oak (C)	37	11	White spruce (U)	8	31
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	51	17	Red pine (U)	8	29
Bur oak (C,U)	58	19	Round-leaved pyrola (<i>Pyrola rotundifolia</i>)	7	23
Tall blackberries*	20	7	Twinflower (<i>Linnæa borealis</i>)	15	42

*Tall blackberries (*Rubus allegheniensis* and similar *Rubus* spp.) **Groundpine (*Lycopodium dendroideum* or *L. hickeyi*)

• FDC24 Central Rich Dry Pine Woodland

FDC24 can be similar to FDC34 but is strongly dominated by jack pine with only occasional red pine, white pine, paper birch, northern red oak, or aspen. FDC24 is more likely to have species present on relatively poor soils derived from deep deposits of sand and gravel. FDC34 is more likely to have species that occur on sites where relatively fine-textured and rich soils are within the reach of deeper rooting plants.

FDC34 Indicator Species	(freq%)		FDC24 Indicator Species	(freq%)	
	FDC34	FDC24		FDC34	FDC24
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	51	2	Pussytoes (<i>Antennaria</i> spp.)	-	18
White pine (C)	46	4	Hoary puccoon (<i>Lithospermum canescens</i>)	-	11
Fly honeysuckle (<i>Lonicera canadensis</i>)	27	4	Blue giant hyssop (<i>Agastache foeniculum</i>)	2	42
Rose twistedstalk (<i>Streptopus roseus</i>)	68	11	Jack pine (C,U)	17	84
Round-leaved dogwood (<i>Cornus rugosa</i>)	44	11	Pin cherry (<i>Prunus pensylvanica</i>)	7	33
Bunchberry (<i>Cornus canadensis</i>)	39	11	Erect, Smooth, or Illinois carrion-flower*	5	18
Bluebead lily (<i>Clintonia borealis</i>)	46	13	Prairie willow (<i>Salix humilis</i>)	20	62
Red maple (C,U)	80	31	Pipsissewa (<i>Chimaphila umbellata</i>)	7	20

* Erect, Smooth, or Illinois carrion-flower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*)

• FDC25 Central Dry Oak-Aspen (Pine) Woodland

FDC25 and FDC34 are similar when dominated by aspen and oak (FDC25b vs. FDC34b). Although the range of FDC25 is mostly south and east of FDC34 in eastern WSU and on the Anoka Sand Plain, both classes occur in the southern part of the MDL. FDC25 occurs mainly on sandy river terraces or lacustrine plains, while FDC34 occurs mainly on stagnation moraines. FDC34 is more likely to have species characteristic of closed-canopy forests, while FDC25 often has some species with affinity for open woodland or brushland communities.

FDC34 Indicator Species	(freq%)		FDC25 Indicator Species	(freq%)	
	FDC34	FDC25		FDC34	FDC25
Bluebead lily (<i>Clintonia borealis</i>)	26	-	Northern pin oak (C,U)	-	64
Bunchberry (<i>Cornus canadensis</i>)	26	-	Wild bergamot (<i>Monarda fistulosa</i>)	-	27
Rose twistedstalk (<i>Streptopus roseus</i>)	63	5	Virginia creeper (<i>Parthenocissus</i> spp.)	5	41
Round-leaved dogwood (<i>Cornus rugosa</i>)	58	9	Columbine (<i>Aquilegia canadensis</i>)	5	41
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	58	9	Woodland sunflower (<i>Helianthus strumosus</i>)	5	36
Hairy Solomon's seal (<i>Polygonatum pubescens</i>)	26	5	Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	5	32
Rugulose or Yellow violet*	21	5	Gray dogwood (<i>Cornus racemosa</i>)	16	73
Hairy honeysuckle (<i>Lonicera hirsuta</i>)	32	9	American hazelnut (<i>Corylus americana</i>)	16	73

* Rugulose or Yellow violet (*Viola canadensis* or *V. pubescens*)



• MHC26 Central Dry-Mesic Oak-Aspen Forest

MHC26 is often dominated by some combination of northern red oak, paper birch, quaking aspen, or red maple, occasionally also with a fair amount of bur oak, basswood, or big-toothed aspen (MHC26a), and can be similar to hardwood-dominated stands of FDC34 (FDC34b). MHC26 and FDC34 are often present in fine-scale mosaics on landforms such as stagnation moraines where soil properties vary substantially across short distances. In general, MHC26 is more likely to have some species with affinity for relatively rich soils, while FDC34 is more likely to have some species with affinity for poorer soils.

FDC34 Indicator Species	(freq%)		MHC26 Indicator Species	(freq%)	
	FDC34	MHC26		FDC34	MHC26
Jack pine (C)	11	-	Starflower (<i>Trientalis borealis</i>)	-	45
Tall thimbleweed (<i>Anemone virginiana</i>)	11	-	Fly honeysuckle (<i>Lonicera canadensis</i>)	-	32
Canada goldenrod (<i>Solidago canadensis</i>)	32	2	Erect, Smooth, or Illinois carrion-flower**	-	17
Prairie willow (<i>Salix humilis</i>)	16	1	Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	5	33
Red pine (U)	11	1	Sugar maple (C,U)	11	57
Red-osier dogwood (<i>Cornus sericea</i>)	16	2	Bearded shorthusk (<i>Brachyelytrum erectum</i>)	5	25
Bunchberry (<i>Cornus canadensis</i>)	26	8	Virginia creeper (<i>Parthenocissus</i> spp.)	5	23
Prickly or Smooth wild rose*	74	24	Ironwood (U)	16	57

*Prickly or Smooth wild rose (*Rosa acicularis* or *R. blanda*) ** Erect, Smooth, or Illinois carrionflower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*)

Native Plant Community Types in Class

• FDC34a Red Pine - White Pine Forest

Canopy is dominated by red pine or white pine, or a mixture of the two, with occasional paper birch, red maple, quaking aspen, jack pine, northern red oak, or bur oak. Species that help to differentiate FDC34a from FDC34b include red pine, white pine, starflower (*Trientalis borealis*), fly honeysuckle (*Lonicera canadensis*), columbine (*Aquilegia canadensis*), round-lobed hepatica (*Anemone americana*), and shinleaves and pyrolas (*Pyrola asarifolia*, *P. rotundifolia*, or *P. secunda*). FDC34a has been documented across the MDL and the northern part of the MIM. Description is based on summary of vegetation data from 40 plots.

• FDC34b Oak - Aspen Forest

Canopy is dominated by a combination of northern red oak, quaking aspen, paper birch, red maple, bur oak, big-toothed aspen, or basswood. Species that help to differentiate FDC34b from FDC34a include abundant northern red oak, quaking aspen, bur oak, big-toothed aspen, or basswood in the canopy, tall blackberries (*Rubus allegheniensis* and similar *Rubus* species) in the shrub layer, and Lindley's aster (*Aster ciliolatus*) or Canada goldenrod (*Solidago canadensis*) in the ground layer. FDC34b has been documented in the MDL, the northern part of the MIM, and the northwestern WSU. Description is based on summary of vegetation data from 19 plots.



Cass County, MN

photo by D.S. Wovcha MN DNR



FDC34 Central Dry-Mesic Pine-Hardwood Forest – Species Frequency & Cover

	freq %	cover		freq %	cover		freq %	cover
Forbs, Ferns & Fern Allies								
Canada mayflower (<i>Maianthemum canadense</i>)	97	•••						
Large-leaved aster (<i>Aster macrophyllus</i>)	92	••						
Wild sarsaparilla (<i>Arcia nudicaulis</i>)	92	••						
Bracken (<i>Pteridium aquilinum</i>)	92	••••						
Early meadow-rue (<i>Thalictrum dioicum</i>)	76	••						
Common strawberry (<i>Fragaria virginiana</i>)	76	••						
Wood anemone (<i>Anemone quinquefolia</i>)	71	••						
Rose twistedstalk (<i>Streptopus roseus</i>)	68	••						
Sweet-scented bedstraw (<i>Galium triflorum</i>)	64	••						
Maryland black snakefoot (<i>Sanicula marilandica</i>)	54	••						
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	51	••						
Pale bellwort (<i>Uvularia sessifolia</i>)	51	••						
Pale veitchling (<i>Lathyrus ochroleucus</i>)	47	••						
Bluehead lily (<i>Clitoria borealis</i>)	46	••						
Spreading dogbane (<i>Apocynum androsaemifolium</i>)	44	••						
Dwarf raspberry (<i>Rubus pubescens</i>)	42	••						
Found-lobed hepatica (<i>Anemone americana</i>)	39	••						
Bunchberry (<i>Cornus canadensis</i>)	39	••						
Vainy pea (<i>Lathyrus venosus</i>)	36	••						
Hog peanut (<i>Ampelocarpaea bracteata</i>)	36	••						
Lindley's aster (<i>Aster ciliolatus</i>)	34	••						
Clayton's sweet cicely (<i>Osmorhiza claytonii</i>)	32	••						
Northern bedstraw (<i>Galium boreale</i>)	32	••						
Starflower (<i>Trientalis borealis</i>)	27	••						
Columbine (<i>Aquilegia canadensis</i>)	24	••						
American veitch (<i>Vicia americana</i>)	24	••						
Red baneberry (<i>Actaea rubra</i>)	20	••						
Grasses & Sedges								
Mountain rice grass (<i>Oryzopsis asperifolia</i>)	68	••						
Pennsylvania sedge (<i>Carex pensylvanica</i>)	59	••••						
False meadow grass (<i>Schizachne purpurascens</i>)	29	••						
Climbing Plants								
Wild honeysuckle (<i>Lonicera dioica</i>)	17	••						
Virginia creeper (<i>Parthenocissus</i> spp.)	14	••						
Low Shrubs								
Lowbush blueberry (<i>Vaccinium angustifolium</i>)						61	••	
Red raspberry (<i>Rubus idaeus</i>)						41	•••	
Tall blackberries (<i>Rubus allegheniensis</i> and similar <i>Rubus</i> spp.)						20	•••	
Velvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)						17	••	
Wingreen (<i>Gaultheria procumbens</i>)						15	•	
Shrubs								
Beaked hazelnut (<i>Corylus cornuta</i>)						97	••••	
Bush honeysuckle (<i>Dierilla lonicera</i>)						86	••	
Chokeberry (<i>Purum virginiana</i>)						81	••	
Juneberries (<i>Amelanchier</i> spp.)						68	••	
Poison Ivy (<i>Toxicodendron rydbergii</i>)						66	••	
Prickly or Smooth wild rose (<i>Rosa acicularis</i> or <i>blanda</i>)						68	••	
Downy arrowwood (<i>Viburnum rafinesquianum</i>)						59	••	
Round-leaved dogwood (<i>Cornus rugosa</i>)						44	••	
Snowberry or Wolfberry (<i>Symphoricarpos albus</i> or <i>S. occidentalis</i>)						36	••	
American hazelnut (<i>Corylus americana</i>)						29	•••	
Fly honeysuckle (<i>Lonicera canadensis</i>)						27	••	
Hairy honeysuckle (<i>Lonicera hirsuta</i>)						22	••	
Trees								
		Canopy		Subcanopy		Shrub Layer		
		freq %		freq %		freq %		
Red pine	51	•••••	-	-	-	-	-	
White pine	46	•••••	17	••	34	••		
Paper birch	42	••••	44	••	17	••		
Northern red oak	37	••••	41	••	54	••		
Quaking aspen	36	••••	27	••	44	••		
Red maple	34	••••	59	••••	78	••		
Bur oak	25	••••	36	••	46	••		
Jack pine	17	••	-	-	-	-		
Big-toothed aspen	14	••••	12	••	-	-		
Basswood	8	•••	17	••	15	••		
Black cherry	-	-	20	••	17	••		
Green ash	-	-	15	••	24	••		
Ironwood	-	-	10	••	8	••		